

CLAIMS

What is claimed is:

1. Apparatus for fastening a winding assembly disposed at least partially in an air gap between a stator yoke and a rotor of an electric machine, said fastening apparatus comprising a main body made of electrically insulating non-magnetic material, said main body defined by an axis and including a cylindrical base and a plurality of webs extending in the direction of the axis and projecting radially outwards from the base in a direction of the stator yoke for at least partial engagement in complementary recesses in the stator yoke.
2. The apparatus of claim 1 wherein the webs have a comb-shaped configuration in the direction of the axis and include sections which are radially recessed for attachment of a bandage of the winding assembly.
3. The apparatus of claim 2, wherein the bandage has a thickness which corresponds to a height of the radially recessed sections of the webs.
4. The apparatus of claim 2, wherein the radially recessed sections of the webs as so configured as to allow an arrangement of the bandage in at least one of the wrappings selected from the group consisting of wrapping in circumferential direction and wrapping in helical configuration.

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5. The apparatus of claim 1, wherein the main body has a single-piece configuration.
6. The apparatus of claim 1, wherein the main body includes different segments in at least one of axial direction and circumferential direction.
7. The apparatus of claim 6, wherein the segments have means for allowing interconnection of the segments.
8. The apparatus of claim 7, wherein the segments are interconnected by at least one of material-based joint and form-fitting engagement.
9. The apparatus of claim 1, wherein the winding assembly is secured in place by at least one of a bandage and a casting onto the main body.
10. The apparatus of claim 1, wherein the base of the main body has a closed cylinder surface in a direction toward the rotor.
11. The apparatus of claim 10, wherein the cylinder surface has a net-like structure.

12. The apparatus of claim 11, wherein the cylinder surface of net-like structure is formed by the webs, as extending in axial and substantially in circumferential direction.

13. The apparatus of claim 11, wherein the net-like structure as defined by the webs have toothed members for securement at joint areas in the recesses of the stator yoke.

14. An electric machine, comprising:

a stator yoke;

a rotor spaced from the stator yoke at formation of an air gap therebetween;

a winding assembly disposed at least partially in the air gap and having winding ends which form winding overhangs; and

a fastening apparatus for securing the winding assembly, wherein the fastening apparatus includes a main body made of electrically insulating non-magnetic material, said main body defined by an axis and including a cylindrical base and a plurality of webs extending in the direction of the axis and projecting radially outwards from the base in a direction of the stator yoke for at least partial engagement in complementary recesses in the stator yoke,

wherein the stator yoke projects at least axially beyond the winding overhangs located at an end face of the electric machine.

15. The electric machine of claim 14, wherein the winding overhangs are wrapped by a bandage at least about sections thereof.
16. The electric machine of claim 14, and further comprising axial cooling channels extending between the stator yoke and the winding assembly and having a cross sectional area extending substantially across the winding overhangs.
17. The use of a fastening apparatus according to claim 1 for a superconductive electric machine.
18. The use of claim 17 for synchronous generators.
19. A method of making an electric machine, comprising the steps of:
stacking a plurality of predetermined laminations to form a stator yoke;
radially placing a winding assembly into a fastening apparatus having a non-magnetic main body defined by an axis and including a cylindrical base and a plurality of webs extending in the direction of the axis and projecting radially outwards from the base in a direction of the stator yoke for at least partial engagement in complementary recesses in the stator yoke; and
inserting the fastening apparatus in axial direction into the stator yoke by fixing the radial webs in the stator yoke.

20. The method of claim 19, and further comprising the step of wrapping the winding assembly with a bandage in the fastening apparatus before carrying out the inserting step.
21. The method of claim 18, and further comprising the step of casting the winding assembly in the fastening apparatus before carrying out the inserting step.
22. The method of claim 19, and further comprising the step of positioning an electrically insulating non-magnetic sleeve after the inserting step radially within the winding overhangs of the winding assembly.